INVESTMENT PROJECTS AS A BASIS OF SUSTAINABLE ECONOMIC DEVELOPMENT

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Reproduction or reinvestment is the integral element of sustainable development of modern economy. There is a set of theories for the description of this process, but full understanding of development mechanisms of a separate branch or national economy as a whole does not exist.

The offered model allows describing dynamic development of economy (branch) as a result of investment activity.

$$\begin{cases} \dfrac{dx}{dt} = \gamma_1(p - p_n)x - \gamma_2 xy - \alpha x^2 \\ \dfrac{dy}{dt} = -\dfrac{y}{\tau_1} + \gamma_3 xy + kx \\ \dfrac{dp}{dt} = p_r - \dfrac{p}{\tau_2} - \gamma_4 x \end{cases}, \qquad (1)$$

where x – number of "successful" investments per unit of capital;

y – number of "unsuccessful" investments per unit of capital;

p – average profitability of successful investments;

p_n – natural rate of profitability;

p_r – investment projects efficiency growth rate (without taking into account obsolescence and use in investments);

$\gamma_1(p–p_n)x$ – takes into account investments increase proportionally to the increase of average profitability of projects over natural rate of profitability;

$–\gamma_2 xy$ – item, that takes into account the influence of risk on investments;

$\gamma_3 xy$ – takes into account the increase of "unsuccessful" investments as a result of interaction with "successful";

$–\gamma_4 x$ – takes into account the reduction of investments profitability as a result of perspective investment projects exhaustion;

α – competitive investments ratio;

τ_1 – average time of liquidation of unsuccessful investments;

τ_2 – average time of investment projects obsolescence;

k – ratio, that takes into account probability of transformation of "successful" investments into "unsuccessful".

System's evolution (1) under the following parameters: p_n=*0,05;* p_r=0,04; α=0; γ_1=10; γ_2=1; γ_3=5; γ_4=0,3; τ_1=2,5 years; τ_2=10 years; k=0,05 and initial external impact is represented in figure 1.

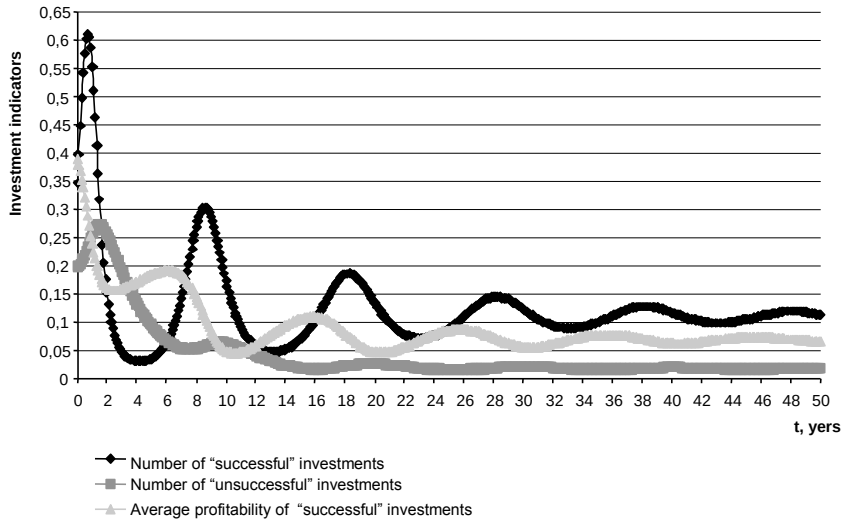

Figure 1 – Fluctuations of investments profitability, shares of "successful" and "unsuccessful" investments

The developed model well displays dynamics of investment development. It not only allows displaying investment fluctuations of economic development, but also shows the essence of the process.

It is clear from figure 1 that with the rise of investment activity, investments profitability begins to decrease because good ideas disappear. Simultaneously with the growth of investments the risk of investments also grows, therefore the share of «unsuccessful» investments grows with a certain delay. Then the inventions, new products etc., which were not introduced because of recession of investment activity, begin to accumulate. As a result, average profitability of investments grows.

The given model distinguishes between developed and developing economy. In a developed economy there is typically a small deviation of average profitability of successful investments from natural rate of profitability. Therefore, there is a low risk of investments. It is accompanied by an insignificant number «unsuccessful» investment. For advanced economy fluctuations quickly fade.

This is quite vice versa for developing economy. At the big deviation p from p_n there is a possibility of big profits, but, on the other hand, it is accompanied by a big risk (growth of "unsuccessful" investments) and respectively long fluctuations. As a result, in such societies superrich people appear and strongly influence national economy. This is an implicit consequence.

Competition of investments stabilizes developing economies.